Kansas Active Transportation Plan

Benefit-Cost Analysis Tool

User Guide

Final April 2022

Kansas Department of Transportation

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Final Report

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Table of Contents

Introduction

Active Transportation has been shown to have over $162 million in annual economic benefits to the State of Kansas. To continue to provide this benefit to the state and to increase the economic impact of active transportation, this toolkit was developed. This toolkit is designed to help local agencies identify bicycling and walking infrastructure projects that will provide a high level of benefit to the state. The tool automatically calculates the economic benefits based on a variety of factors input by the user. The tool is for use on any roadway in Kansas—local city streets, county roads, and state highways.

It is important to remember that this is just one tool in the planning, programming, and design of active transportation facilities. Decisions about active transportation should not be made solely based on the economic benefits, but instead should be made using the full scope of potential benefits in mind which include, benefits to health, equity, community, as well as economic. However, the economic benefits can be a strong indicator of the value of a project and a useful tool to help make project selection and prioritization decisions.

Understanding the Toolkit

Transportation projects are sometimes evaluated for funding opportunities in terms of a Benefit-Cost Ratio (BCR), which measures if the economic benefits of a given project outweigh the costs of constructing and maintaining the project. The benefits that are quantified in a typical Benefit-Cost Analysis (BCA) include benefits such as include travel time savings, environmental benefits, and health benefits. This process is defined by the USDOT in the Benefit-Cost Analysis Guidance for Discretionary Grant Programs.[1]

However, active transportation infrastructure can contribute societal benefits that are not captured in a traditional Benefit-Cost Analysis as defined by the USDOT. In fact, many states have quantified the economic impact of constructing active transportation infrastructure, such as bike lanes or multi-use trails, on their local economies. These benefits include increased tourism (and related expenditures), healthcare cost savings, property value increase, and increased retail spending.

Given that the benefits of constructing active transportation infrastructure are more expansive than what is measured in a traditional BCA, the Benefit-Cost Toolkit was developed in order to quantify selected additional benefits of constructing active transportation infrastructure for local cities in Kansas. This tool has been built to provide local decision-makers with data that they can use to inform project prioritization and planning activities.

The toolkit is comprised of two components:

- **Benefit-Cost Analysis**, which generally aligns with USDOT guidelines to calculate the BCR for a given project; and,
- **Economic Impact Analysis (EIA)**, which quantifies additional economic benefits and their impact on the local economy not typically included in a USDOT style benefit cost analysis.

Combining these two components allows decision-makers to analyze a larger range of economic benefits for a given project. Both components are detailed further in the following sections.

[1] https://www.transportation.gov/office-policy/transportation-policy/benefit-cost-analysis-guidance-discretionary-grant-programs-0

Components of Benefit-Cost Toolkit

Benefit-Cost Analysis

A BCA is an evaluation framework to assess the economic advantages (benefits) and disadvantages (costs) of an investment alternative. Benefits and costs are broadly defined and are quantified in monetary terms to the extent possible. The overall goal of a BCA is to assess whether the expected benefits of a project justify the costs. A BCA framework attempts to capture the net welfare change created by a project, including cost savings and increases in welfare (benefits), as well as disbenefits where costs can be identified (e.g., project capital costs).

The BCA framework involves defining a Base Case or "No Build" Case, which is compared to the "Build" Case, where the project is built as proposed. The BCA assesses the incremental difference between the Base Case and the Build Case, which represents the net change in welfare. BCAs are forward-looking exercises which seek to assess the incremental change in welfare over a project lifecycle. The importance of future welfare changes is determined through discounting, which is meant to reflect both the opportunity cost of capital as well as the societal preference for the present.

The analysis was created to align with the benefit-cost methodology as recommended by the USDOT. This methodology includes the following analytical assumptions:

- Defining existing and future conditions under a No Build base case as well as under the Build Case;
- Estimating benefits and costs during project construction and operation, including years of operations[2] beyond the Project completion when benefits accrue;
- Using USDOT recommended monetized values and travel time savings;
- Presenting dollar values in real 2021 dollars. In instances where cost estimates and benefits valuations are expressed in historical or future dollar years, using an appropriate inflation factor to adjust the values; and,
- Discounting future benefits and costs with a real discount rate.[3]

In addition, data was included in the safety benefits analysis to link state-specific circumstances and outcomes to the BCA. This data includes:

- State-specific crash rates for each road type in Kansas based on crash analysis results;
- State-specific monetized values for bike/pedestrian crashes and vehicle crashes; and,
- Project-specific crash modification factors (CMF) for selected project improvement categories for bike/pedestrian users and vehicles.

Economic Impact Analysis

The EIA is an additional method to quantify the economic benefits of constructing active transportation infrastructure on local economies in Kansas. There are multiple aspects of a given project that could produce economic benefits for local economies, such as increased tourism, construction job opportunities, reduced healthcare expenditures, property value increase, and retail sales. The toolkit analyzes the economic benefits associated with each of these categories. Direct expenditures in these categories can have ripple effects on local economies, which is quantified using multipliers; for every dollar spent in a certain benefit category, there is a

[2] USDOT guidance recommends 20 years; however, this tool enables users to input their own operations period.
[3] USDOT guidance recommends a discount rate of 7 percent; however, this tool enables users to apply their own discount rate.

"multiplied" effect on the local economy. These multiplier benefits are accounted for throughout the toolkit model.

Appropriate Use of Toolkit

Who is this toolkit for? What purpose does it serve?

This toolkit was constructed for use by local agencies in Kansas to help make project selection and prioritization easier. As described above, this toolkit will provide information on the benefits and costs related to the specific project, based on user inputs and data included in the model itself. The toolkit should be considered one tool to be used in the larger planning, programming, and design efforts of active transportation projects.

What are the limitations of this toolkit? What should it not be used for?

As this toolkit depends on high level project and location inputs, it is not an authoritative source for BCA calculations for grant applications. It should not be used for project scoring or funding. Rather, this toolkit will provide insight as to whether a project will likely have a good BCR with a full USDOT BCA (as required in RAISE and INFRA discretionary grant program applications) or with other funding programs such as HSIP.

The toolkit should also be utilized within the larger framework of planning, programming, and designing active transportation facilities. If an active transportation facility has been shown to be desirable to the community and important for network connectivity and other considerations, a low BCR reported by this toolkit should not disqualify the project for consideration by the community. Likewise, a project with a high BCR reported by this toolkit may not be appropriate for implementation if the community does not desire the project and the project is not part of a larger network plan.

How should results be interpreted?

This toolkit, which was built to provide a high-level analysis of project costs and benefits, should be used for project selection and prioritization, rather than as an authoritative source for USDOT grant applications. The results will provide insight as to whether or not a project might be competitive in a grant scenario.

The following sensitivity analysis should be used when interpreting results:

- BCR > 1.5: Reasonable to assume that the more detailed analysis will likely show a good BCR
- 0.5 < BCR < 1.5: Final results will depend on more detailed project inputs in a full BCA
- BCR < 0.5: Reasonable to assume that a more detailed analysis will likely not show a good BCR

Using the Toolkit

Toolkit Standard Format

The toolkit is developed as a Microsoft Excel spreadsheet comprised of numerous tabs that flow into one another depending on user inputs, each of which follow a standardized formatting that makes it simpler to understand what each tab is used for and the meaning behind different cell values. Tabs are associated with specific colors depending on their use in the model; similarly, certain cells are shaded or contain colored text.

There are 24 tabs in total. These tabs are divided into one of six categories, which are associated with a specific color, detailed below.

	Teal Shading - Intro Materials
	Orange Shading - User Input Values, reflecting project-specific information and user selections
	Blue Shading – Summary
	Green Shading - Standard Input Values, reflecting guidance from USDOT and other sources
	Light Pink Shading – Calculations

Within each of the tabs, different colors of text and cell shading provide information on a given cell's values, as shown below.

	Light Yellow Cell Shading - User Input Value
	Light Grey Cell Shading - Default User Input (User Input Value Optional)
	Blue Text - Input from Another Sheet
	Red Text - Exported to Another Sheet

Tab Overview

As described above, tabs are categorized based on their use in the model. This section describes each tab in the given categories and how they are integrated into the model.

	Intro – Describes the tool itself and provides Tab Reference and Cell Reference information to inform the user. **How-To** – Describes how to input values and understand the results of the model.
	User Inputs[4] – Interface for users to input project-specific information that informs the model.
	Executive Summary[5] – Summary of model outputs, separated into BCA and EIA results. This tab pulls in data from BCA Summary and EIA Summary tabs. **BCA Summary** – Summary of BCA calculations. This tab pulls in data from the Costs, Benefits, and Resid. Value tabs. **EIA Summary** – Summary of EIA calculations. This tab pulls in data from each of the EIA tabs: EIA – CapEx, EIA – Health, EIA – Tourism, EIA – Property, and EIA – Retail.
	Proj Types – Contains information based on specific project types, including default capital costs, job and income multipliers, project components, and associated crash modification factors for bicycles/pedestrians and vehicles. This information is used in the Capital Costs tab, Safety Calc tab, and EIA – CapEx tab.

[4] See User Inputs section of this document for more information.
[5] See Understanding the Results section of this document for more information on Summary tabs.

	Capital Costs – Calculates default value for capital expenditures based on project type. Pulls in values from Proj Types based on User Inputs. Calculation is only used in model if user elects to use default values in User Input tab. If selected, this calculation is used in Costs tab.

User Inputs

The model was designed to create a user interface where users can input project-specific information and preferences in the **User Inputs** tab. This tab is divided into sections based on how each cell's values are utilized throughout the model.

A general project input row is depicted below.

Variable	Source	Units	Input Value	Default Value	Notes
PROJECT SPECIFIC INPUTS					
Construction					
Construction Start Year	Project Defined	Year	2021		*Beginning of construction*
Construction Period	Project Defined	Years	3		*Length of construction*
Project Opening Year	Calculated	Year	2024		*Calculated, no input needed*
Operations Period (Analysis Period)	User Defined	Years	30	30	*Recommended in the 20-35 year range*
Analysis End Year	Calculated	Year	2053		*Calculated, no input needed*

Figure 1: Example of User Input Interface

Users should follow these guidelines when inputting values:

1. Users should type values and select options in cells that are shaded yellow.
    a. Guidance in the Notes column on the right side of the interface is provided to assist users with identifying appropriate values and clarifying project inputs.
    b. As this is a general tool for estimating the BCR and economic impact of a project, inputting general values, such as population and impacted properties, in User Inputs is reasonable.[6]
2. Cells that are shaded grey indicate to the user that a default value is coded into the model; if the user *does not* enter a value in an orange cell, the default value will be automatically used.
3. Instructions are provided in **bolded** font when specific guidance is necessary.

Understanding the Results

Results from the analysis can be found in the Executive Summary tab. This tab aggregates the results from the BCA and EIA tabs in an easily accessible interface. Detailed annual results are available in the BCA Summary and EIA Summary tabs.

Benefit Cost Analysis Results

The **Executive Summary** tab contains a BCA section, where results from BCA calculations are presented, as depicted in the example below.

[6] For assistance locating reasonable inputs for population data, visit https://www.census.gov/quickfacts/

Benefit Cost Ratio				
	Benefit Cost Ratio*	-	**Ratio**	**2.20**
	Based on the calculated BCR, it is reasonable to assume that a more detailed analysis will likely show a good BCR			
Net Present Value				
	Net Present Value	-	2021$ in 2021	4,999,820
Benefits				
	Operations Period (Analysis Period)	User Defined	Years	20
	Total Benefits (Discounted)	-	2021$ in 2021	9,166,022
	Average Yearly Benefits		2021$ in 2021	458,301
Costs				
	Operations Period (Analysis Period)	User Defined	Years	20
	Total Costs (Discounted)	-	2021$ in 2021	4,166,203
	Average Yearly Costs		2021$ in 2021	208,310

Figure 2: Example of Benefit-Cost Analysis Results in Executive Summary Tab

Benefits are monetized in the following ways:

- **Benefit-Cost Ratio (BCR):** Measures the present value of the benefits compared to the present value of the costs. Generally, if the BCR is greater than 1, the benefits to society outweigh the costs of constructing the project. However, if the BCR is below 1, reference the additional Economic Project Ratio in the EIA section; this ratio accounts for the monetized benefits that have been quantified in the economic impact analysis portion of the toolkit, which expands the benefits that are included in the calculation.
- **Net Present Value (NPV):** The overall magnitude of cashflows over time in today's dollar terms, calculated by comparing the net benefits (benefits minus costs) after being discounted.
- **Total Benefits (Discounted):** Total monetized benefits accrued over analysis period, discounted at user-defined discount rate.[7]
- **Average Yearly Benefits:** Measures Total Benefits (Discounted) divided by the analysis period, providing a high-level estimate of monetized benefits that can be expected in a given year of the analysis period.

Economic Impact Analysis Results

The **Executive Summary** tab contains an EIA section, where results from EIA calculations are presented, as depicted in the example below.

The EIA analysis results are broken out into three sections in order to provide a more detailed view of the economic benefits:

- **Overall Economic Impact:** Aggregates data from capital expenditures, reduced healthcare expenditures, and retail spending
- **Tax Revenue:** Aggregates data from increases in property value and subsequent additional tax levied over analysis period.
- **Tourism:** Aggregates data from tourism direct expenditures.

[7] A discount rate is used to determine the present value of future cash flows.

ECONOMIC IMPACT ANALYSIS

Economic Project Ratio (Benefits & Economic Impact / Cost)			
Economic Project Ratio		**Ratio**	**3.92**
Overall Economic Impact			
Economic Benefits Time Period	Calculated	Years	22
Total Output - Discounted	-	2021$ in 2021	5,868,430
Total Jobs	-	-	71
Average Yearly Total Economic Output Benefits		2021$ in 2021	266,747
Average Yearly Jobs Supported		-	3
Operations Period (Analysis Period)	User Defined	Years	20
Total Income - Discounted	-	2021$ in 2021	18,376
Average Yearly Total Economic Income Benefits		2021$ in 2021	919
Tax Revenue (Project Lifetime)			
Operations Period (Analysis Period)	User Defined	Years	20
Total Additional Tax Levied - Discounted	-	2021$ in 2021	1,304,135
Average Yearly Additional Tax Revenue Benefits		2021$ in 2021	65,207
Tourism Economic Impact			
Operations Period (Analysis Period)	User Defined	Years	20
Total Spent by Tourists - Discounted	-	2021$ in 2021	-
Tourism Total Economic Output - Discounted	-	2021$ in 2021	-
Tourism Jobs	-	-	-
Tourism Income - Discounted	-	2021$ in 2021	-
Average Yearly Expenditures by Tourists		2021$ in 2021	-
Average Yearly Economic Output for Tourism		2021$ in 2021	-
Average Yearly Tourism Jobs		-	-
Average Yearly Tourism Related Income		2021$ in 2021	-

Figure 3: Example of Economic Impact Analysis Results in Executive Summary Tab

Economic impact is monetized in the following general categories:

- **Total Output (Discounted):** Measures the total production value of each industry, including labor income, as a result of direct expenditures. It quantifies the "multiplied" effect that direct expenditures can have on the economy. This is discounted at the user-defined discount rate.
- **Jobs:** Total number of job-years across sectors (one person employed for one year) that are supported by economic activity.
- **Income (Discounted):** Measures employee compensation as a result of direct expenditures. It is included in the Total Output number, but is calculated separately in the model to provide an additional reference point of economic impact. This is discounted at the user-defined discount rate.
- **Total Additional Tax Levied (Discounted):** Measures the impact of a one-time residential property value increase on additional property tax levied, discounted at user-defined discount rate.

Example Analyses

Example 1: Typical Project-Level Application

This section will explore an example project that can be analyzed in the model. In this scenario, the user is seeking to assess the benefit of constructing a one-mile bicycle/pedestrian street project in Shawnee County. They do not have an estimate of capital expenditures.

In the first section of User Inputs, shown in Figure 4, the user will include the discount rate they wish to use and the beginning year of the model. This user has decided to use a 5% discount rate and start the model in 2021. Notice that these inputs are orange; since the user wanted to use a lower discount rate (5%), they added this input. If they had not included a value in that box, the 7% discount rate would have been used.

Variable	Source	Units	Input Value	Default Value	Notes
GENERAL INPUTS					
Discount Rate	User Defined	Percent	5.0%	7%	*Recommended in*
Model Start Year	User Defined	Year		2021	*Recommended to*
Base Year (for benefits inflation)	User Defined	Year		2021	*Recommended to*
Base Year (for discounting)	User Defined	Year		2021	*Recommended to*

Figure 4: General Inputs

In the next subsection of User Inputs, shown in Figure 5, the user will include information about the project.

In the Construction subsection, the user inputs the year of construction and the construction period; below, the model calculates the opening year of the project. The user decided to look at the benefits of the project over a 20-year period, and the model calculates the end year of the analysis based on that time horizon.

In the Project Type subsection, the user selects the facility type that most closely aligns with the intended project from a drop-down list. This project takes place in urban environment, so the user selects “urban.” The project is a one-mile bicycle/pedestrian project, so the length of both bicycle and pedestrian facilities is 1. In the proposed project area, the current speed limit is 35. The user does not want to consider parking cost savings in this analysis, so they have selected that parking costs are not included. The project is located in Shawnee County, so the user selects from a drop-down list.

Variable	Source	Units	Input Value	Default Value	Notes
PROJECT SPECIFIC INPUTS					
Construction					
Construction Start Year	Project Defined	Year	2021		*Beginning of c*
Construction Period	Project Defined	Years	2		*Duration of co*
Project Opening Year	Calculated	Year	2023		*Calculated, no*
Operations Period (Analysis Period)	User Defined	Years	20	30	*Recommended*
Analysis End Year	Calculated	Year	2042		*Calculated, no*
Project Type					
Facility Type	Project Defined	Option	Road infrastructure with bicycle and pedestrian facilities		*Select the opti*
Urban or Rural Location	Project Defined	Location	Urban		*Urban is cities*
Project length - Bicycle Facilities	Project Defined	Miles	1.0		*Length of bicy*
Project length - Pedestrian Facilities	Project Defined	Miles	1.0		*Length of pede*
Project length - Total	Project Defined	Miles	*1.0*		*Calculated, to*
Project Setting Speed Limit	Project Defined	Miles per hour	35		*Current speed*
Parking Cost Included (Yes/No)?	User Defined	Yes/No	No		*Input needed f*
Average Cost of Parking per Trip	User Defined	$s / Trip	$0.00		*Cost of parking*
County	Project Defined	Option	Shawnee		*Select county*

Figure 5: Project Specific Inputs

In the Property Values section, the user estimates that there is a 0.5% population growth rate, 1000 residential properties near the project, and 2,000 residents. These numbers can often be obtained using data from the US Census Bureau.

Variable	Source	Units	Input Value	Default Value	Notes
PROPERTY AND RESIDENTS					
Population Growth Rate	User Defined	Percent per year	0.5%		*Estimated popula*
Number of Impacted Residential Properties	User Defined	Number	1,000		*Properties located*
Number of Residents in Project Proximity	User Defined	Number	2,000		*Number of reside*

Figure 6: Properties and Residents

In the Bike Ridership Details subsection, shown in Figure 7. In this section, you can enter actual bicycle ridership numbers if you have those available. If not, an estimate is made based on the population in the area, the project proximity radius, and the estimated adult usage.

In absence of empirical data, the proximity and adult usage are both based on professional judgement. If a facility is a high quality facility or a long-distance facility, users are more likely to travel to use it than a low quality or short distance facility. Similarly, if many cyclists in the area are long-distance commuters or long distance recreational cyclists, they may be more likely to travel further to access a facility as compared to short trip casual riders. Adult bicycle usage estimate acts as a multiplier for the work commute bicycling share. If low is selected the commute bicycle usage is used, if moderate the total bike share is calculated as 0.4% + 2 * (commute mode share), if high the total bike share is calculated as 0.6% + 3 * (commute mode share). In this project, the user input ½ mile radius and a high adult cycling usage.

The bicycle speed is also entered based on professional judgement if not empirical data is available. Generally, cyclists travel at 8 - 14 miles per hour when riding on city streets and accounting for delays at intersections depending on the terrain. In absence of delays, such as on a facility like a shared use path, cyclists can typically travel at 12 – 18 miles per hour on average depending on the terrain. In this example, it is estimated that the bicycle facility will moderately reduce delay for cyclists and the no-build speed is set at 10 mph and the build speed at 12 mph.

The bicycle mode share is based on the commuting mode share. This user assumes that the bike mode share is 0.36% of the population, which is the statewide average. This data can commonly be obtained from the US Census Bureau if no local data is available, but care should be used in evaluating small area commute data, considering it can suffer from very small sample sizes. When in doubt, the state wide average suffices in most cases.

Variable	Source	Units	Input Value	Default Value	Notes
BIKE RIDERSHIP DETAILS					
Is annual bike ridership data available?		Option	No		
Annual Ridership	User Defined	Riders			
Estimated New Riders due to Project	User Defined	Riders			
Base Year for Ridership Estimates	User Defined	Year		2021	*Year when ridershi*
Select Project Proximity Radius	User Defined	Miles	1/2 Mile		*Radius of bikers; in*
Adult Bike Use Rate	User Defined	Percent	High		*Use judgment in ar*
Average Bicycle Speed - No-Build	Project Defined	Miles per hour	10		*Recommended 10-*
Average Bicycle Speed - Build	Project Defined	Miles per hour	12		*Use judgement bas*
Bike Commuting Mode Share	User Defined	Percent		0.36%	*Statewide average*

Figure 7: Bike Ridership Details

In Pedestrian Details, shown in Figure 8, the user inputs information related to pedestrians in the project area. Similar to the bicycle mode share data, if no local data is available, professional judgement is used to develop these numbers. The Walk Mode Share Estimate is based on the percentage of population that can be considered a pedestrian on a regular basis. This is based on commuters walking to work and all other trips. Commute walk share can be obtained from the US Census Bureau and typically ranges from 2% - 15% in Kansas. Many others walk on a regular basis as compared to commuting to work, so all population pedestrian estimates are typically 3x – 5x higher than commute mode share. In this example a walk mode share estimate of 10% was used. The increase of the existing pedestrians. In this example, the user input 20%, which would mean 2% more people in the project area would be predestrian (20% increase of original 10% = 12%).

Variable	Source	Units	Input Value	Default Value	Notes
PEDESTRIAN DETAILS					
Base Year for Pedestrian Estimates	User Defined	Year		2021	*Year when pedestria*
Walk Mode Share Estimate	Project Defined	Percent of Population	10%		*Percent of populatio*
Walk Mode Share increase for New Trails	User Defined	Percent	20%		*Estimated increase in*

Figure 8: Pedestrian Details

In the Tourism section, the user chooses to leave the inputs blank as they do not anticipate any tourism benefits as a result of the project.

Variable	Source	Units	Input Value	Default Value	Notes
TOURISM					
Is there tourism data available for the project area?		Option	No		*Continue to next*
Overnight Tourist Average Total Expenditure	UTA 2017	2022$ per night			
Number of Nights per Tourist (Overnight Tourists)	User Defined	Nights / Tourist			
Number of Overnight Tourists	User Defined	Tourists / year			
Day Trip Tourist Average Total Expenditure	UTA 2017	2022$ per day			
Number of Day Trip Tourists	User Defined	Tourists / year			

Figure 9: Tourism

In the Safety and Crash details subsection, shown in Figure 10, the user selects the project location that most closely aligns with the project location from a drop-down list. This calculates the average crash rates for pedestrians, cyclists, and drivers for the area unless crash numbers are provided. The user does not have specific crash modification factor information for this project, nor do they have the number of crashes per mile; in this instance, the user has left those fields blank and default values based on the project improvement type (prior input) and project location will be used. The crash modification factors and crash numbers are provided in the model for the generic project types. In general, it is best to provide a crash modification factor for the specific type of project being constructed.

On the other hand, it is optimal to utilize the average crash rates in the model for the corridor type rather than providing site specific crash data, unless the project location is known to have an elevated crash rate. The crash rates provided in the model correspond to the expected crash rates based on a statewide analysis. This gives a more accurate estimate of the number of crashes that are likely to occur in the future on the corridor with no changes.

Variable	Source	Units	Input Value	Default Value	Notes
SAFETY AND CRASH DETAILS					
Project-Specific Crash Information					
What is the location of the project?	Project Defined	Option	Urban (50,000+)		*Select option that most clo*
What type of road is this project on?	Project Defined	Option	Local Road		*Select option that most clo*
What is the average annual daily traffic?	Project Defined	Option	5,000-15,000		*Select option that most clo*
Is the CMF for the project improvement type known?		Option	No		
Bike/Ped CMF	User Defined	Factor			*Default values will be used*
Vehicle CMF	User Defined	Factor			*Default values will be used*
Are crash numbers for the project area known?		Option	No		
Bike/Ped Crashes	User Defined	Crashes per mile per year			*Default values will be used*
Vehicle Crashes	User Defined	Crashes per mile per year			*Default values will be used*

Figure 10: Safety and Crash Details

In the Capital Costs subsection, shown in Figure 11, the user indicates that they do not have a cost estimate for the project. Therefore, the model will incorporate a capital cost estimate based on the project improvement type (prior input). Also in this subsection are “No-Build” costs. There are none, so the user has left these field blank.

Variable	Source	Units	Input Value	Default Value	Notes
CAPITAL COSTS					
Year of Unit/Total Cost Estimate	User Defined	Year	2022		*Set the cost basis year*
Project Build Scenario					
Are capital costs known?	User Defined	Option	No		*Leave following cells b*
Preliminary Engineering & Design	Project Defined	2022$s			
Construction	Project Defined	2022$s			
Contingency	Project Defined	2022$s			
PM/CM & Administration	Project Defined	2022$s			
Total Cost (if not delineated above)	Project Defined	2022$s			
No-Build Scenario					
Are "No-Build" capital costs known?	User Defined	Option	No		*Continue to next secti*
Preliminary Engineering & Design	Project Defined	2022$s			
Construction	Project Defined	2022$s			
Contingency	Project Defined	2022$s			
PM/CM & Administration	Project Defined	2022$s			
Total Costs (if not delineated above)	Project Defined	2022$s			

Figure 11: Capital Costs

In the Maintenance and Rehabilitation subsection, shown in Figure 12. Again, these costs are unknown for the project, so the user has indicated this and the model will provide estimates of these costs.

Variable	Source	Units	Input Value	Default Value	Notes
MAINTENANCE AND REHABILITATION					
Build Scenario					
Are maintenance costs known?	User Defined	Option	No		
Operations & Maintenance	Project Defined	2021$s / year			
Rehabilitation and Replacement	Project Defined	2021$s / year			
Operations & Maintenance - Estimated	User Estimate	Percent of CapEx per Year			*Include estimate of anr*
Rehabilitation & Replacement - Estimated	User Estimate	Percent of CapEx per Year			*Include estimate of anr*
No-Build Scenario					
Operations & Maintenance	Project Defined	2021$s / year			*Annual expenditure. Th*
Rehabilitation & Replacement	Project Defined	2021$s / year			*Annual expenditure. Th*

Figure 12: Maintenance and Rehabilitation

In the Residual Value section, shown in Figure 13, the user has estimated that the lifespan of the asset is 30 years.

Variable	Source	Units	Input Value	Default Value	Notes
RESIDUAL VALUE					
Expected Lifespan of Asset		Years	20	30	*Recommended in the*
Last Purchase Year (Opening Year)	Previous Input	Year	2023		*Calculated, no input*
Analysis End Year	Previous Input	Year	2042		*Calculated, no input*

Figure 13: Residual Value

After inputting each of these values, the user then checks the Executive Summary tab to see what the BCR and economic impact of the project might be. As shown below, the BCR is over 1, suggesting to the user that the benefits outweigh the costs for this project.

Benefit Cost Ratio				
Benefit Cost Ratio*		-	**Ratio**	**2.20**
Based on the calculated BCR, it is reasonable to assume that a more detailed analysis will likely show a good BCR				
Net Present Value				
Net Present Value		-	2021$ in 2021	4,999,820
Benefits				
Operations Period (Analysis Period)		User Defined	Years	20
Total Benefits (Discounted)		-	2021$ in 2021	9,166,022
Average Yearly Benefits			2021$ in 2021	458,301
Costs				
Operations Period (Analysis Period)		User Defined	Years	20
Total Costs (Discounted)		-	2021$ in 2021	4,166,203
Average Yearly Costs			2021$ in 2021	208,310

Figure 14: Benefit Cost Analysis Results in Executive Summary

The user can also view the EIA results. Additional benefits are calculated than are typically allowed in a USDOT methodology benefit-cost analysis, so a higher economic project ratio is obtained than the benefit-cost ratio shown above.

ECONOMIC IMPACT ANALYSIS

Economic Project Ratio (Benefits & Economic Impact / Cost)			
Economic Project Ratio		**Ratio**	**3.92**
Overall Economic Impact			
Economic Benefits Time Period	Calculated	Years	22
Total Output - Discounted	-	2021$ in 2021	5,868,430
Total Jobs	-	-	71
Average Yearly Total Economic Output Benefits		2021$ in 2021	266,747
Average Yearly Jobs Supported		-	3
Operations Period (Analysis Period)	User Defined	Years	20
Total Income - Discounted	-	2021$ in 2021	18,376
Average Yearly Total Economic Income Benefits		2021$ in 2021	919
Tax Revenue (Project Lifetime)			
Operations Period (Analysis Period)	User Defined	Years	20
Total Additional Tax Levied - Discounted	-	2021$ in 2021	1,304,135
Average Yearly Additional Tax Revenue Benefits		2021$ in 2021	65,207
Tourism Economic Impact			
Operations Period (Analysis Period)	User Defined	Years	20
Total Spent by Tourists - Discounted	-	2021$ in 2021	-
Tourism Total Economic Output - Discounted	-	2021$ in 2021	-
Tourism Jobs	-	-	-
Tourism Income - Discounted	-	2021$ in 2021	-
Average Yearly Expenditures by Tourists		2021$ in 2021	-
Average Yearly Economic Output for Tourism		2021$ in 2021	-
Average Yearly Tourism Jobs		-	-
Average Yearly Tourism Related Income		2021$ in 2021	-

Figure 15: Economic Impact Analysis Results in Executive Summary

If the user wanted to view a detailed overview of the benefits in costs in each given year throughout the analysis period, the BCA Summary and EIA Summary tabs provide that breakdown.

Example 2: Prairie Spirit Trail Analysis

The example of the Prairie Spirit Trail was analyzed. The trail is a rail to trails project which seeks to convert old rail tracks into a connected trail system. In this scenario, the user is seeking to assess the yearly economic benefit for the possible construction of the project and use this information to assess the feasibility of further rails to trails projects. This estimate includes capital expenditures of a project of this size to analyze the full benefit-cost of the project if it were built today. A rough map of the trail section which was analyzed is shown in below in Figure 16.

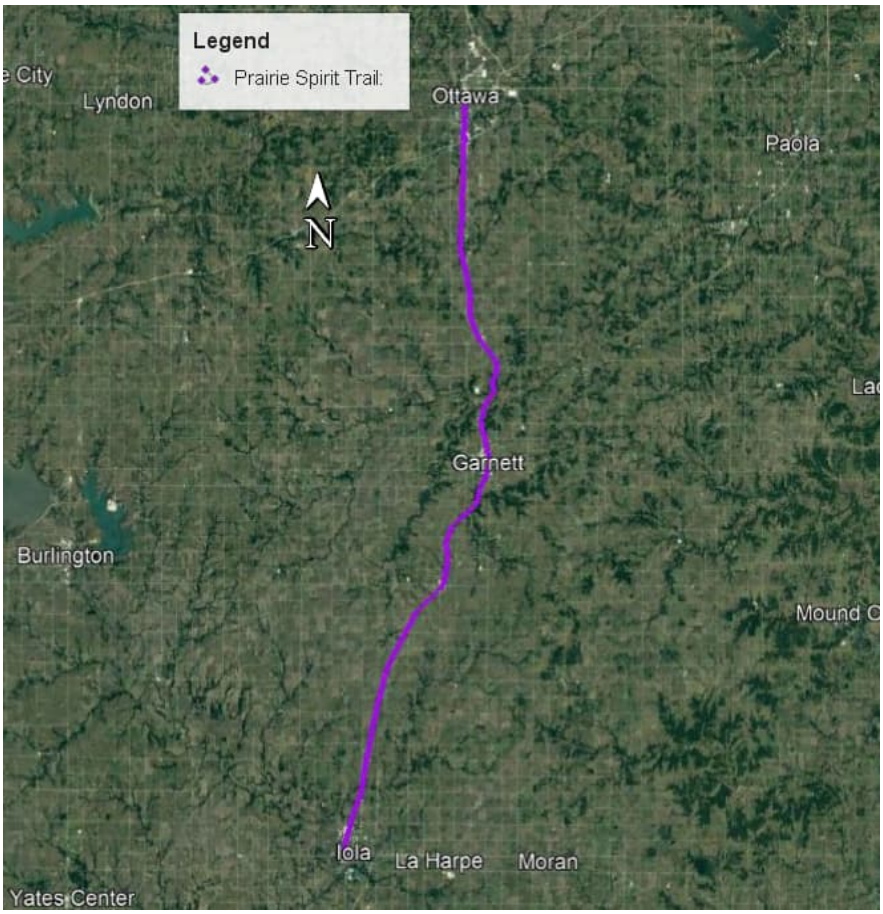

Figure 16: Prairie Spirit Trail Ottawa to Iola

In the first section of user inputs, shown in Figure 17. This project was determined to have a 3% discount rate and is using the current year (2021) as the starting year of the model.

Variable	Source	Units	Input Value	Default Value	Notes
GENERAL INPUTS					
Discount Rate	User Defined	Percent	3.0%	7%	*Recommer*
Model Start Year	User Defined	Year		2021	*Recommer*
Base Year (for benefits inflation)	User Defined	Year		2021	*Recommer*
Base Year (for discounting)	User Defined	Year		2021	*Recommer*

Figure 17: General Inputs for Prairie Spirit Trail

In the next subsection for the Prairie Spirit Trail analysis, the project specific user inputs needed are shown in Figure 18. In the construction subsection, the user inputs for the year of construction and the construction period were taken as 2021 to determine the economic impact of the project if it were built today. A 30-year period was chosen for this analysis. In the project type subsection, the trail was defined as “Off Street Multi Use Trail”. This project takes place in rural environment, spread over 3 counties, though most of this project is in Anderson county, so this was used as the baseline. The current length of the area to be analyzed stretches from Ottawa in the north to Iola in the south, totaling the first 3 sections built over 51 miles.

Variable	Source	Units	Input Value	Default Value	Notes
PROJECT SPECIFIC INPUTS					
Construction					
Construction Start Year	Project Defined	Year	2021		*Beginning of constructi*
Construction Period	Project Defined	Years	1		*Duration of constructio*
Project Opening Year	Calculated	Year	2022		*Calculated, no input ne*
Operations Period (Analysis Period)	User Defined	Years		30	*Recommended in the 2*
Analysis End Year	Calculated	Year	2051		*Calculated, no input ne*
Project Type					
Facility Type	Project Defined	Option	Off street multi-use trails		*Select the option that n*
Urban or Rural Location	Project Defined	Location	Rural		*Urban is cities populati*
Project length - Bicycle Facilities	Project Defined	Miles	51.0		*Length of bicycle faciliti*
Project length - Pedestrian Facilities	Project Defined	Miles	51.0		*Length of pedestrian fa*
Project length - Total	Project Defined	Miles	*51.0*		*Calculated, total length*
Project Setting Speed Limit	Project Defined	Miles per hour	45		*Current speed limit in p*
Parking Cost Included (Yes/No)?	User Defined	Yes/No	No		*Input needed for urban*
Average Cost of Parking per Trip	User Defined	$s / Trip	$0.00		*Cost of parking vehicle*
County	Project Defined	Option	Anderson		*Select county of project*

Figure 18: Project Specific Inputs

In the Property Values section seen in Figure 19, using census data it is estimated there are 9000 residential properties, 24,000 residents, and a 0.0% growth rate within the proximity of the Prairie Spirit Trail.

Variable	Source	Units	Input Value	Default Value	Notes
PROPERTY AND RESIDENTS					
Population Growth Rate	User Defined	Percent per year	0.0%		*Estimated population gro*
Number of Impacted Residential Properties	User Defined	Number	9,000		*Properties located adjace*
Number of Residents in Project Proximity	User Defined	Number	24,000		*Number of residents in pr*

Figure 19: Property Numbers near Prairie Spirit Trail

The bike ridership details is seen subsection, shown in Figure 20. This is a long-distance trail, so it is expected to attract new riders from a 1-mile radius. Bicycle commute mode share is assumed be low at 0.1%, but a high number of recreational riders compared to the commute mode share, so the adult bicycle usage rate was noted as high. Because this is a rural area on gravel roads, a relatively low 10 mph average speed was used. The high quality trail will greatly increase ability to ride at a higher average speed, so 14 mph was used. This user assumes that the bike commute mode share is low at 0.10% of the population, which is approximately 1/3 the statewide average.

Variable	Source	Units	Input Value	Default Value	Notes
BIKE RIDERSHIP DETAILS					
Is annual bike ridership data available?		Option	No		
Annual Ridership	User Defined	Riders			
Estimated New Riders due to Project	User Defined	Riders			
Base Year for Ridership Estimates	User Defined	Year		2021	*Year when ridership*
Select Project Proximity Radius	User Defined	Miles	1 Mile		*Radius of bikers; infl*
Adult Bike Use Rate	User Defined	Percent	High		*Use judgment in are*
Average Bicycle Speed - No-Build	Project Defined	Miles per hour	10		*Recommended 10-2*
Average Bicycle Speed - Build	Project Defined	Miles per hour	14		*Use judgement base*
Bike Commuting Mode Share	User Defined	Percent	0.10%	0.36%	*Statewide average i*

Figure 20: Bike Ridership Details for Prairie Spirit Trail

In the pedestrian Details section, shown in Figure 21, the user inputs information related to pedestrians in the project area. Because this is a rural area, it is assumed that most people are not regular pedestrians, so this number was set at 2%. However, with the construction of the trail it is assumed that many more people adjacent to the trail will walk recreationally, so the mode share increase was estimated at 20%.

Variable	Source	Units	Input Value	Default Value	Notes
PEDESTRIAN DETAILS					
Base Year for Pedestrian Estimates	User Defined	Year		2021	*Year when pedestric*
Walk Mode Share Estimate	Project Defined	Percent of Population	2%		*Percent of populatic*
Walk Mode Share Increase for New Facilities	User Defined	Percent	20%		*Estimated increase*

Figure 21: Pedestrian Details for Prairie Spirit Trail

In the tourism section seen in Figure 22, it is inputted that Prairie Spirit Trail receives 66,000 annual visitors, which is the estimate according to data from Wichita State University. It is estimated that 80% of the visitors are day trip with 20% being overnight staying an average of 2.0 days.

Variable	Source	Units	Input Value	Default Value	Notes
TOURISM					
Is there tourism data available for the project area?		Option	Yes		
Overnight Tourist Average Total Expenditure	UTA 2017	2022$ per night		191.63	*Overnight tourist expend*
Number of Nights per Tourist (Overnight Tourists)	User Defined	Nights / Tourist	2.0		*Average number of nigh*
Number of Overnight Tourists	User Defined	Tourists / year	6,000		*Number of overnight tou*
Day Trip Tourist Average Total Expenditure	UTA 2017	2022$ per day		36.61	*Day trip tourist expendit*
Number of Day Trip Tourists	User Defined	Tourists / year	60,000		*Number of day trip touri*

Figure 22: Tourism Data for Prairie Spirit Trail

The safety and crash details subsection, is shown in Figure 23. The project location that most closely aligns with the project from a drop-down list, a rural local road with an AADT of under 5000. The specific crash modification factor information for this project is left blank to use the default values.

Variable	Source	Units	Input Value	Default Value	Notes
SAFETY AND CRASH DETAILS					
Project-Specific Crash Information					
What is the location of the project?	Project Defined	Option	Rural		*Select option that mos*
What type of road is this project on?	Project Defined	Option	Local Road		*Select option that mos*
What is the average annual daily traffic?	Project Defined	Option	Under 5,000		*Select option that mos*
Is the CMF for the project improvement type known?		Option	No		
Bike/Ped CMF	User Defined	Factor			*Default values will be*
Vehicle CMF	User Defined	Factor			*Default values will be*
Are crash numbers for the project area known?		Option	No		
Bike/Ped Crashes	User Defined	Crashes per mile per year			*Default values will be*
Vehicle Crashes	User Defined	Crashes per mile per year			*Default values will be*

Figure 23: Safety and Crash Details

The capital costs subsection, shown in Figure 24. In this example, approximate capital expenditure costs for the project are known, so they are entered in the cells. The no-build costs are $0.00 because no expenses would be incurred by the agency if the trail were not built.

Variable	Source	Units	Input Value	Default Value	Notes
CAPITAL COSTS					
Year of Unit/Total Cost Estimate	User Defined	Year	2022		*Set the cost basis year fo*
Project Build Scenario					
Are capital costs known?	User Defined	Option	Yes		*Fill in rows 90-93 or 95.*
Preliminary Engineering & Design	Project Defined	2022$s	$ 2,500,000.00		*Input preliminary engine*
Construction	Project Defined	2022$s	$ 32,000,000.00		*Input construction costs*
Contingency	Project Defined	2022$s	$ 3,000,000.00		*Input contingency*
PM/CM & Administration	Project Defined	2022$s	$ 1,500,000.00		*Input program managem*
Total Cost (if not delineated above)	Project Defined	2022$s		$39,000,000.00	*Input total capital costs*
No-Build Scenario					
Are "No-Build" capital costs known?	User Defined	Option	Yes		*Input values for rows 10*
Preliminary Engineering & Design	Project Defined	2022$s	$ -		*Input preliminary engine*
Construction	Project Defined	2022$s	$ -		*Input construction costs*
Contingency	Project Defined	2022$s	$ -		*Input contingency*
PM/CM & Administration	Project Defined	2022$s	$ -		*Input program managem*
Total Costs (if not delineated above)	Project Defined	2022$s		$ -	*Input total capital costs*

Figure 24: Capital Costs of Prairie Spirit Trail

In the maintenance and rehabilitation subsection, shown in Figure 25, it is generally assumed from that for a rail to trail project such as this, the maintenance fees are generally around $5000 per mile per year and one $50,000 rehab/replacement project would be needed along the trail per year.

Variable	Source	Units	Input Value	Default Value	Notes
MAINTENANCE AND REHABILITATION					
Build Scenario					
Are maintenance costs known?	User Defined	Option	Yes		
Operations & Maintenance	Project Defined	2021$s / year	$ 255,000.00		*Annual expenditure*
Rehabilitation and Replacement	Project Defined	2021$s / year	$ 50,000.00		*Annual expenditure*
Operations & Maintenance - Estimated	User Estimate	Percent of CapEx per Year			
Rehabilitation & Replacement - Estimated	User Estimate	Percent of CapEx per Year			
No-Build Scenario					
Operations & Maintenance	Project Defined	2021$s / year			*Annual expenditure. Th*
Rehabilitation & Replacement	Project Defined	2021$s / year			*Annual expenditure. Th*

Figure 25: Maintenance and Rehabilitation of the Trail

In the residual value section, shown in Figure 26, the project has estimated that the lifespan of the asset is 30 years.

Variable	Source	Units	Input Value	Default Value	Notes
RESIDUAL VALUE					
Expected Lifespan of Asset		Years		30	*Recommended in the 20-35*
Last Purchase Year (Opening Year)	Previous Input	Year	2022		*Calculated, no input needed*
Analysis End Year	Previous Input	Year	2051		*Calculated, no input needed*

Figure 26: Residual Value

After inputting each of these values for the project, the Executive Summary tab was checked to see what the BCR and economic impact of the project might be. As shown below, the BCR for construction of the rails to trails Prairie Spirit Trail would be 7.16 if constructed today, suggesting benefits outweigh the costs for this project. This can be seen in Figure 27. Overall, it was found that the yearly benefits of the project amount to $9.2 million yearly, and $236.9 million over 30 years.

Benefit Cost Ratio			
Benefit Cost Ratio*	-	**Ratio**	**7.16**
Based on the calculated BCR, it is reasonable to assume that a more detailed analysis will likely show a good BCR			
Net Present Value			
Net Present Value	-	2021$ in 2021	236,907,776
Benefits			
Operations Period (Analysis Period)	User Defined	Years	30
Total Benefits (Discounted)	-	2021$ in 2021	275,372,193
Average Yearly Benefits		2021$ in 2021	9,179,073
Costs			
Operations Period (Analysis Period)	User Defined	Years	30
Total Costs (Discounted)	-	2021$ in 2021	38,464,417
Average Yearly Costs		2021$ in 2021	1,282,147

Figure 27: Benefit Cost Analysis

The project EIA results were also reviewed and can be seen below in Figure 28. In this example, the economic impact benefit numbers are much higher than the benefit-cost analysis numbers because of the estimated tourism generated by the trail.

Economic Project Ratio (Benefits & Economic Impact / Cost)			
Economic Project Ratio		**Ratio**	**20.92**
Overall Economic Impact			
Economic Benefits Time Period	Calculated	Years	31
Total Output - Discounted	-	2021$ in 2021	400,739,778
Total Jobs	-	-	4,215
Average Yearly Total Economic Output Benefits		2021$ in 2021	12,927,090
Average Yearly Jobs Supported		-	136
Operations Period (Analysis Period)	User Defined	Years	30
Total Income - Discounted	-	2021$ in 2021	3,169,992
Average Yearly Total Economic Income Benefits		2021$ in 2021	105,666
Tax Revenue (Project Lifetime)			
Operations Period (Analysis Period)	User Defined	Years	30
Total Additional Tax Levied - Discounted	-	2021$ in 2021	15,692,474
Average Yearly Additional Tax Revenue Benefits		2021$ in 2021	523,082
Tourism Economic Impact			
Operations Period (Analysis Period)	User Defined	Years	30
Total Spent by Tourists - Discounted	-	2021$ in 2021	88,120,803
Tourism Total Economic Output - Discounted	-	2021$ in 2021	112,956,461
Tourism Jobs	-	-	2,527
Tourism Income - Discounted	-	2021$ in 2021	40,206,226
Average Yearly Expenditures by Tourists		2021$ in 2021	2,937,360
Average Yearly Economic Output for Tourism		2021$ in 2021	3,765,215
Average Yearly Tourism Jobs		-	84
Average Yearly Tourism Related Income		2021$ in 2021	1,340,208

Figure 28: EIA Analysis

Example 3: Newton Citywide Analysis

The bicycle and walking trails in the City of Newton were analyzed was analyzed for this example. In this scenario, the user is seeking to assess the yearly economic of the bike trails. There is no estimate of capital expenditures beyond maintenance, assuming that the trail construction costs have been fully depreciated due to the age of the trails. This example will show the enduring value of trails to a community long after they are constructed. A rough map of the trail section which was analyzed is shown in below in Figure 29.

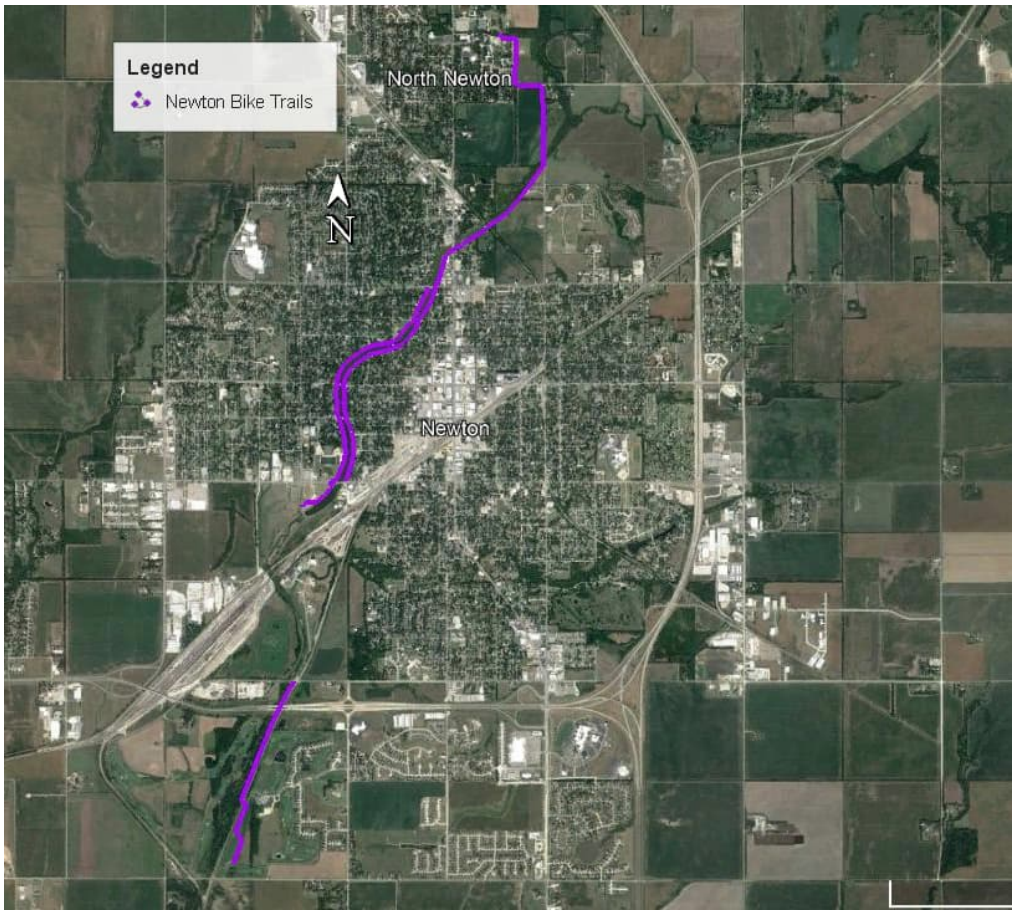

Figure 29: Newton Bike Trails

In the first section of user inputs, is shown in Figure 30. This project was determined to have a 3% discount rate and is using the current year (2021) as the starting year of the model in 2021.

Variable	Source	Units	Input Value	Default Value	Notes
GENERAL INPUTS					
Discount Rate	User Defined	Percent	3.0%	7%	*Recommended in the 3% to*
Model Start Year	User Defined	Year		2021	*Recommended to set at 202*
Base Year (for benefits inflation)	User Defined	Year		2021	*Recommended to set at 202*
Base Year (for discounting)	User Defined	Year		2021	*Recommended to set at 202*

Figure 30: General Inputs for Newton Bike Facilities

In the next subsection for the Newton Analysis, the inputs needed are shown in Figure 31. In the construction subsection, the user inputs for the year of construction and the construction period; taken as 2021 to determine current impacts. A 1-year period was chosen for this analysis to determine an annual benefit. In the project type subsection, the trail was defined as “Off-Street Multi-Use Trail” for the purpose of the analysis. This project takes place in an urban environment, in Harvey County. The current length of the area to be analyzed is 7 miles.

Variable	Source	Units	Input Value	Default Value	Notes
PROJECT SPECIFIC INPUTS					
Construction					
Construction Start Year	Project Defined	Year	2021		*Beginning of construction*
Construction Period	Project Defined	Years	1		*Duration of construction*
Project Opening Year	Calculated	Year	2022		*Calculated, no input neede*
Operations Period (Analysis Period)	User Defined	Years	1	30	*Recommended in the 20-3*
Analysis End Year	Calculated	Year	2022		*Calculated, no input neede*
Project Type					
Facility Type	Project Defined	Option	Off street multi-use trails		*Select the option that mos*
Urban or Rural Location	Project Defined	Location	Urban		*Urban is cities population*
Project length - Bicycle Facilities	Project Defined	Miles	7.0		*Length of bicycle facilities*
Project length - Pedestrian Facilities	Project Defined	Miles	7.0		*Length of pedestrian facili*
Project length - Total	Project Defined	Miles	7.0		*Calculated, total length of*
Project Setting Speed Limit	Project Defined	Miles per hour	35		*Current speed limit in proj*
Parking Cost Included (Yes/No)?	User Defined	Yes/No	No		*Input needed for urban ar*
Average Cost of Parking per Trip	User Defined	$s / Trip	$0.00		*Cost of parking vehicle*
County	Project Defined	Option	Harvey		*Select county of project; ir*

Figure 31: Project Specific Inputs

In the Property Values section is seen in Figure 32. Using census data, it is estimate there are 3470 residential properties, 9,430 residents, and 0.0% growth rate within the proximity of the trails.

Variable	Source	Units	Input Value	Default Value	Notes
PROPERTY AND RESIDENTS					
Population Growth Rate	User Defined	Percent per year	0.0%		*Estimated population growt*
Number of Impacted Residential Properties	User Defined	Number	3,720		*Properties located adjacent*
Number of Residents in Project Proximity	User Defined	Number	9,430		*Number of residents in proje*

Figure 32: Property Numbers near Newton Trail

The Bike Ridership Details subsection, is shown in Figure 33 which shows the population growth rate and radius of the project included in the analysis. Generally, cyclists were assumed to travel at 10 miles per hour in the project area, but with the project they will see a 2 mile per hour enhancement. It also assumes that the recreational cyclists numbers are high compared to commuting, so the adult bike use rate is noted as "high." This user entered the bike mode share of 0.6% of the population, obtained from the US Census Bureau data.

Variable	Source	Units	Input Value	Default Value	Notes
BIKE RIDERSHIP DETAILS					
Is annual bike ridership data available?		Option	No		
Annual Ridership	User Defined	Riders			
Estimated New Riders due to Project	User Defined	Riders			
Base Year for Ridership Estimates	User Defined	Year		2021	*Year when ridership estim*
Select Project Proximity Radius	User Defined	Miles	1 Mile		*Radius of bikers; influence*
Adult Bike Use Rate	User Defined	Percent	High		*Use judgment in area who*
Average Bicycle Speed - No-Build	Project Defined	Miles per hour	10		*Recommended 10-20 Mph*
Average Bicycle Speed - Build	Project Defined	Miles per hour	12		*Use judgement based on f*
Bike Commuting Mode Share	User Defined	Percent	0.60%	0.36%	*Statewide average is 0.36*

Figure 33: Bike Ridership Details

In Pedestrian Details, shown in Figure 34, the user input information related to pedestrians in the project area. An estimate was made of 5% of the population being pedestrians, considering the commute mode share for walking in Newton is approximately 2% and the city is generally walkable. With the trails, it is estimated that 20% more people walk than would otherwise walk without the trails.

Variable	Source	Units	Input Value	Default Value	Notes
PEDESTRIAN DETAILS					
Base Year for Pedestrian Estimates	User Defined	Year		2021	*Year when pedestrian es*
Walk Mode Share Estimate	Project Defined	Percent of Population	5%		*Percent of population th*
Walk Mode Share Increase for New Facilities	User Defined	Percent	20%		*Estimated increase in pe*

Figure 34: Pedestrian Details

The Tourism section can be seen in Figure 35. It was assumed that the trails lead to a moderate increase in tourism in Newton compared to having no trails because of the elevated reputation of Netwon as a walkable, bikeable community with some additional activities for visitors.

Variable	Source	Units	Input Value	Default Value	Notes
TOURISM					
Is there tourism data available for the project area?		Option	Yes		
Overnight Tourist Average Total Expenditure	UTA 2017	2022$ per night		191.63	*Overnight tourist expend*
Number of Nights per Tourist (Overnight Tourists)	User Defined	Nights / Tourist	1.0		*Average number of night*
Number of Overnight Tourists	User Defined	Tourists / year	500		*Number of overnight tou*
Day Trip Tourist Average Total Expenditure	UTA 2017	2022$ per day		36.61	*Day trip tourist expenditu*
Number of Day Trip Tourists	User Defined	Tourists / year	1,000		*Number of day trip touri*

Figure 35: Tourism Data for Newton

The Safety and Crash details subsection, is shown in Figure 36. The project location that most closely aligns with the project from a drop-down list, an urban local road with an AADT 5000 - 15000. The specific crash modification factor information for this project is left blank to use the default values.

Variable	Source	Units	Input Value	Default Value	Notes
SAFETY AND CRASH DETAILS					
Project-Specific Crash Information					
What is the location of the project?	Project Defined	Option	Urban (2,500-50,000)		*Select option that most cl*
What type of road is this project on?	Project Defined	Option	Local Road		*Select option that most cl*
What is the average annual daily traffic?	Project Defined	Option	5,000-15,000		*Select option that most cl*
Is the CMF for the project improvement type known?		Option	No		
Bike/Ped CMF	User Defined	Factor			*Default values will be use*
Vehicle CMF	User Defined	Factor			*Default values will be use*
Are crash numbers for the project area known?		Option	No		
Bike/Ped Crashes	User Defined	Crashes per mile per year			*Default values will be use*
Vehicle Crashes	User Defined	Crashes per mile per year			*Default values will be use*

Figure 36: Safety and Crash Details

The Capital Costs subsection, is shown in Figure 37. This example is intended to show the ongoing economic benefits of a trail system, rather than a benefit to cost ratio, considering the trails were constructed long ago and the costs have been fully depreciated. To calculate this, a capital cost of $0.00 is entered.

Variable	Source	Units	Input Value	Default Value	Notes
CAPITAL COSTS					
Year of Unit/Total Cost Estimate	User Defined	Year	2022		*Set the cost basis year for*
Project Build Scenario					
Are capital costs known?	User Defined	Option	Yes		*Fill in rows 90-93 or 95.*
Preliminary Engineering & Design	Project Defined	2022$s	$ -		*Input preliminary engineer*
Construction	Project Defined	2022$s	$ -		*Input construction costs*
Contingency	Project Defined	2022$s	$ -		*Input contingency*
PM/CM & Administration	Project Defined	2022$s	$ -		*Input program manageme*
Total Cost (if not delineated above)	Project Defined	2022$s		$ -	*Input total capital costs if*
No-Build Scenario					
Are "No-Build" capital costs known?	User Defined	Option	Yes		*Input values for rows 101-*
Preliminary Engineering & Design	Project Defined	2022$s	$ -		*Input preliminary engineer*
Construction	Project Defined	2022$s	$ -		*Input construction costs*
Contingency	Project Defined	2022$s	$ -		*Input contingency*
PM/CM & Administration	Project Defined	2022$s	$ -		*Input program manageme*
Total Costs (if not delineated above)	Project Defined	2022$s		$ -	*Input total capital costs if*

Figure 37: Capital Costs of Newton Bike Infrastructure

In the Maintenance and Rehabilitation subsection, shown in Figure 38, the user has indicated that there are approximately $100,000 in O&M fees yearly and $50,000 in rehabilitation and replacement fees annually to maintain the existing trail system.

Variable	Source	Units	Input Value	Default Value	Notes
MAINTENANCE AND REHABILITATION					
Build Scenario					
Are maintenance costs known?	User Defined	Option	Yes		
Operations & Maintenance	Project Defined	2021$s / year	$ 100,000.00		*Annual expenditure*
Rehabilitation and Replacement	Project Defined	2021$s / year	$ 50,000.00		*Annual expenditure*
Operations & Maintenance - Estimated	User Estimate	Percent of CapEx per Year			
Rehabilitation & Replacement - Estimated	User Estimate	Percent of CapEx per Year			
No-Build Scenario					
Operations & Maintenance	Project Defined	2021$s / year	$ -		*Annual expenditure*
Rehabilitation & Replacement	Project Defined	2021$s / year	$ -		*Annual expenditure*

Figure 38: Maintenance and Rehabilitation of the Facilities

In the Residual Value section, shown in Figure 39, the project has estimated that the lifespan of the asset is 30 years.

Variable	Source	Units	Input Value	Default Value	Notes
RESIDUAL VALUE					
Expected Lifespan of Asset		Years	1	30	*Recommended in the 20-35*
Last Purchase Year (Opening Year)	Previous Input	Year	2022		*Calculated, no input needed*
Analysis End Year	Previous Input	Year	2022		*Calculated, no input needed*

Figure 39: Residual Value

After inputting each of these values for the project, the Executive Summary tab was checked to see what the BCR and economic impact of the project might be. As shown below, the BCR for the trail is shown as a divide by zero error. This is because there is no cost for the benefit to cost ratio calculation. However, the totally yearly benefit of the trail system can be seen as $1.9 million for the trail system based on USDOT benefit cost analysis methodology. This can be seen in Figure 40.

Benefit Cost Ratio			
Benefit Cost Ratio*	**-**	**Ratio**	**#DIV/0!**
	#DIV/0!		
Net Present Value			
Net Present Value	-	2021$ in 2021	1,947,016
Benefits			
Operations Period (Analysis Period)	User Defined	Years	1
Total Benefits (Discounted)	-	2021$ in 2021	1,947,016
Average Yearly Benefits		2021$ in 2021	1,947,016
Costs			
Operations Period (Analysis Period)	User Defined	Years	1
Total Costs (Discounted)	-	2021$ in 2021	-
Average Yearly Costs		2021$ in 2021	-

Figure 40: Benefit Cost Analysis

The project EIA results were also reviewed and can be seen below in Figure 41. Again, the ratio is shown as a divide by zero error because there are no project costs. However, the economic benefits can be seen. When totaled, the economic benefits equal approximately $4.0 million annually. Adding the benefit-cost analysis benefits and the economic impact benefits, the Newton trail system is estimated to have an annual benefit to the community of $6.0 million.

Economic Project Ratio (Benefits & Economic Impact / Cost)			
Economic Project Ratio		**Ratio**	**#DIV/0!**
Overall Economic Impact			
Economic Benefits Time Period	Calculated	Years	1
Total Output - Discounted	-	2021$ in 2021	2,627,060
Total Jobs	-	-	18
Average Yearly Total Economic Output Benefits		2021$ in 2021	2,627,060
Average Yearly Jobs Supported		-	18
Operations Period (Analysis Period)	User Defined	Years	1
Total Income - Discounted	-	2021$ in 2021	690,040
Average Yearly Total Economic Income Benefits		2021$ in 2021	690,040
Tax Revenue (Project Lifetime)			
Operations Period (Analysis Period)	User Defined	Years	1
Total Additional Tax Levied - Discounted	-	2021$ in 2021	365,251
Average Yearly Additional Tax Revenue Benefits		2021$ in 2021	365,251
Tourism Economic Impact			
Operations Period (Analysis Period)	User Defined	Years	1
Total Spent by Tourists - Discounted	-	2021$ in 2021	128,562
Tourism Total Economic Output - Discounted	-	2021$ in 2021	169,159
Tourism Jobs	-	-	2
Tourism Income - Discounted	-	2021$ in 2021	61,658
Average Yearly Expenditures by Tourists		2021$ in 2021	128,562
Average Yearly Economic Output for Tourism		2021$ in 2021	169,159
Average Yearly Tourism Jobs		-	2
Average Yearly Tourism Related Income		2021$ in 2021	61,658

Figure 41: EIA Analysis